June Recommended Readings

Montgomery, D.R., and L.H. MacDonald. 2002. Diagnostic approach to stream channel assessment and monitoring. Journal of the American Water Resources Association 38:1-16. *A must read for those interested in monitoring stream systems. It takes many of the practical suggestions made by Rosgen, and puts scientific meat on these suggestions.*

ABSTRACT: We suggest that a diagnostic procedure, not unlike that followed in medical practice, provides a logical basis for stream channel assessment and monitoring. Our argument is based on the observation that a particular indicator or measurement of stream channel condition can mean different things depending upon the local geomorphic context and history of the channel in question. This paper offers a conceptual framework for diagnosing channel condition, evaluating channel response, and developing channel-monitoring programs. The proposed diagnostic framework assesses reach-level channel conditions as a function of location in the channel network, regional and local biogeomorphic context, controlling influences such as sediment supply and transport capacity, riparian vegetation, the supply of in-channel flow obstruction, and disturbance history. Field assessments of key valley bottom and active channel characteristics are needed to formulate an accurate diagnosis of channel characteristics. A similar approach and level of understanding is needed to design effective monitoring programs, as stream type and channel state greatly affect the type and magnitude of channel response to changes in discharge and sediment loads. General predictions are made for five channel types with respect to the response of various stream characteristics to an increase in coarse sediment, inputs, fine sediment inputs, and the size and frequency of peak flows, respectively. These predictions provide general hypotheses and guidance for channel assessment and monitoring. However, the formulation of specific diagnostic criteria and monitoring protocols must be tailored to specific geographic areas because of the variability in the controls on channel condition within river basins and between regions. The diagnostic approach to channel assessment and monitoring requires a relatively high level of training and experience, but proper application should result in useful interpretation of channel conditions and response potential.

Roni, P., T.J. Beechie, R.E. Bilby, F.E. Leonetti, M.M. Pollock, and G.R. Press. 2002. A review of stream restoration techniques and a hierarchical strategy for prioritizing restoration in Pacific Northwest Watersheds. North American Journal of Fisheries Management 22:1-20. *A good review of how to prioritize restoration projects within a basin. Although written for the Pacific Northwest, the conclusions of this paper are broadly applicable to other systems.*

Millions of dollars are spent annually on watershed restoration and stream habitat improvement in the U.S. Pacific Northwest in an effort to increase fish populations. It is generally accepted that watershed restoration should focus on restoring natural processes create and maintain habitat rather than manipulating instream habitats. However, most process-based restoration is site-specific, that is, conducted on a short stream reach. To synthesize site-specific techniques into process-based watershed restoration strategy, we

reviewed the effectiveness of various restoration techniques at improving fish habitat and developed a hierarchical strategy for prioritizing them. The hierarchical strategy we present is based on three elements: (1) principles of watershed processes, (2) protecting existing high-quality habitats, and (3) current knowledge of the effectiveness of specific techniques. Initially, efforts should focus on protecting areas with intact processes and high quality habitat. Following a watershed assessment, we recommend that restoration focus on reconnecting isolated high-quality habitat, such as instream or off-channel habitats made inaccessible by culverts or other artificial obstructions. Once connectivity of habitats within a basin has been restored, efforts should focus on restoring hydrologic, geologic (sediment delivery and routing), and riparian processes through road decommissioning and maintenance, exclusion of livestock, and restoration of riparian areas. Instream habitat enhancement (e.g., additions of wood, boulders, or nutrients) should be employed after restoring natural processes or where short-term improvements in habitat are needed (e.g., habitat for endangered species). Finally, existing research and monitoring is inadequate for all the techniques we reviewed, and additional, comprehensive physical and biological evaluations or most watershed restoration methods are needed.

Radecki-Pawlik, A. 2002. Bankfull discharge in mountain streams: theory and practice. Earth Surface Processes and Landforms. 27:115-123. *The best short history and overview of methods used to establish bankfull discharge/width I've read*.

The results are presented of an investigation of bankfull discharge in two Polish Carpathian streams: Skawica and Krzyworzeka. Existing definitions of river bankfull were reviewed and applied in tests carried out on selected cross-sections of the streams. The Woodyer method was given special attention, with a correspondingly detailed survey of plants characterizing river benches. Riley's bench index method and the methods of Williams, Wolman, Schumm and Brown, and Woloszyn were tested. The report concludes that bankfull discharge value for a mountain stream should not be reported as a single number, but rather as a range of discharges within which one could expect the bankfull value to lie.